

Amendments to the Drawings

The attached sheet of drawing includes new FIG. 13. In FIG. 13, arrows indicating the direction of sensor signal to and from the sensors, controller, and flow control devices are shown.

REMARKS/ARGUMENTS

Claims 1, 3, 27, and 40-47 are pending. Claims 37-39 have been cancelled without prejudice. Claims 1 and 27 have been amended. These amendments are supported throughout the specification, for example at page 19, lines 23-25, and page 21, lines 5-11.

New claims 40-47 have been added. New claims 40 and 44 are supported throughout the specification, for example, at page 21, lines 5-11. Claims 41 and 47 are supported in the specification by claim 1 as originally filed. New claims 43 and 45 are supported throughout the specification, for example, in Figure 4. New independent claim 46 is supported in the specification, for example, at page 21, lines 5-11. No new matter has been added.

Drawings

The drawings were objected to for failing to show the embodiments of claims 37-39. As noted above, claims 37-39 have been cancelled without prejudice. However, claims 1 and 27 have been amended to incorporate similar subject matter. Accordingly, Figure 13 is submitted herewith. Figure 13 is supported throughout the specification, for example at page 19, lines 23-25, and page 21, lines 5-11.

Rejections Under 35 U.S.C. §102

Claims 1, 3 and 27 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,964,732 to Cadeo (hereinafter Cadeo). This rejection is respectfully traversed.

Each of claims 1 and 27 has been amended, as presented, to overcome this rejection and patentably distinguish over Cadeo. Specifically, claim 1 has been amended to recite, in part, a blending system comprising a process control system comprising a second flow control device positioned on the second material supply line, a second sensor positioned on the second material supply line, and a controller to provide a control signal to each of the first and second flow control devices based upon the first and second sensor signals. Claim 27 has been amended to recite, in part, a method of supplying blended process materials, comprising sensing a first parameter of the first material to provide a first sensor signal, sensing a second parameter of the second material to provide a second sensor signal, and regulating each of the first and the second process materials based upon the first and second sensor signals.

Cadeo fails to disclose, teach, or suggest a blending system comprising a controller to provide a control signal to each of the first and the second flow control devices based upon first and second sensor signals, as recited in part, in independent claim 1. Similarly, Cadeo fails to disclose, teach, or suggest a method of supplying blended process material comprising, in part, regulating the supply of each of first and second process materials based upon first and second sensor signals, as recited in independent claim 27.

Cadeo discloses a system and method of mixing multiple components, wherein each component is recirculated until a steady state for each component is established. An input line for each component comprises a flow meter 10 connected to controller 9, which in turn controls a control valve 15. (Cadeo, column 2, line 64 through column 3, line 6.) Cadeo also discloses switch-over valves 11 which remain closed during initial start-up so that the value detected at the flowmeter reaches its rated value. In Cadeo, after steady state is reached in each input line, switch-over valves 11 are opened to direct the components to a mixer 13. If any of the flowmeters 10 detect an out of tolerance deviation, all switch-over valves 11 are closed so that all components are once again recirculated and no components are directed to mixer 13. (Cadeo, column 4, lines 26-40.) However, each controller 9 of Cadeo controls their respective valve 15 based solely upon a signal from their respective flowmeter 10, without any input from the flowmeters on other component input lines.

Unlike Cadeo, the present invention as recited in independent claim 1 provides, in part, a controller that provides a control signal to a first flow control device, and also to a second flow control device, based upon a first sensor signal and a second sensor signal. Similarly, the present invention as recited in independent claim 27 regulates the supply of each of the first and second process materials based upon first and second sensor signals. As such, independent claims 1 and 27 patentably distinguish over Cadeo. Claim 3 depends directly from independent claim 1, and patentably distinguishes over Cadeo for at least the above mentioned reasons. Withdrawal of this rejection is, therefore, respectfully requested.

Rejection Under 35 U.S.C. §103

Claims 1, 3, 27, and 37-39 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,432,607 to Jones (hereinafter Jones) in view of Cadeo. This rejection is respectfully traversed.

One skilled in the art would not have combined Jones and Cadeo for the reasons asserted in the Office Action or for any other reason. Jones discloses an apparatus and method of continuously blending two streams of volatile liquid components comprising adjusting the flow to a tee valve of one component to compensate for variations of the other component. In Jones, a microprocessor 20 compares the flow rate of a hydrocarbon blowing agent measured by the second mass flow meter 40 to the flow rate of liquid carbon dioxide, measured by the first mass flow meter 18. Depending upon the comparison, a signal is transmitted over a line 39 to a flow control valve 42 to adjust the flow rate of the hydrocarbon blowing agent to maintain a desired ratio. (Jones, column 5, line 61 through column 6, line 1.) The components are blended at a suitable tee. Jones also discloses mixing a third volatile component with the blend of the blowing agent and the liquid carbon dioxide, in a similar manner, in that a comparison of the flow of the blend and the flow of the third component results in an adjustment to the flow of the third component. (Jones, column 7, lines 36-53.)

As noted above, Cadeo discloses a system and method for discontinuous mixing of multiple components, wherein all input flows are completely interrupted by switch-over valves 11 when an out of tolerance deviation is detected in any of the input lines. Cadeo ensures that each component reaching the mixer is within an accepted tolerance, otherwise none of the components are diverted to a static mixer. One skilled in the art would not combine the mixing system of Cadeo with the continuous mixing system of Jones, because the systems and methods of Jones and Cadeo are incompatible, requiring the alternatives of either providing components to a mixer only when they are within tolerance, or continually adjusting flow of one component based on deviations detected with the other component. Although each reference is directed to mixing, they relate to alternative approaches. Either each individual component is adjusted before all components are diverted to a mixer or one component is adjusted in response to changes with the other component while flowing to the mixer.

Moreover, even if Jones and Cadeo were combined in the manner asserted, each of claims 1 and 27 still patentably distinguishes over the combination. The invention as recited in claim 1 distinguishes over Jones and Cadeo because neither reference, individually or in the asserted combination, teaches a controller to provide a control signal to each of the first and the second flow control devices based upon the first and the second sensor signals. Similarly, neither of these reference, individually or in the asserted combination, teaches a method of supplying blended process material comprising, in part, regulating the supply of each of first and second process materials based upon first and second sensor signals, as recited in independent claim 27. Simply put, Cadeo, fails to cure the deficiencies of Jones. As such, independent claims 1 and 27 are patentable over these references, either alone, or in combination. Claim 3 depends directly from claim 1, and is patentable for at least the above mentioned reasons. Claims 37-39 have been cancelled without prejudice. Withdrawal of this rejection is therefore, respectfully requested.

New independent claim 46 is directed to a blending system to provide a blend having a determined composition, comprising, in part, means, responsive to changes in concentration of at least one of the first and second materials, for adjusting the amount of first and second materials while continuously providing a substantially constant volumetric flow rate of blended material having a determined composition. Cadeo and Jones, either alone or in combination, fail to disclose, teach, or suggest, means for adjusting the amount of first and second materials to provide a substantially constant volumetric flow rate of blended material having a determined composition.

Jones discloses an apparatus and method of continuously blending two streams by adjusting the flow of only one of the streams without adjusting the flow of the other. As a result, the volumetric flow output will necessarily vary while the desired blend ratio is maintained. Further, Jones does not adjust the flow of both components and fails to disclose valves to do so.

Cadeo discloses a system and method for discontinuous mixing of multiple components wherein all input flows to a static mixer are completely interrupted by switch-over valves 11 when one or more components are out of tolerance. In contrast, as described in Applicant's specification, adjusting the input flow rates of the first and second process materials while maintaining a desired blend eliminates fluctuations in overall output flow rate. (Present

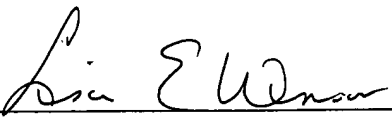
application, page 19, lines 16-25.) Thus, even if the actual density of process material inputs fluctuates, the specified endpoint flow rate and density are substantially constant during adjustments. (Present application, page 21, lines 5- 11.) As such, claim 46 is patentable over these references. Claims 40-44 and 45 depend directly or indirectly from independent claim 1 and 27, respectively, and are patentable for at least the above mentioned reasons. Claim 47 depends directly from claim 46, and is patentable over for at least the above mentioned reasons.

CONCLUSION

In view of the foregoing amendments and remarks, this application is now in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicants' attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee that is not covered by an enclosed check please charge any deficiency to Deposit Account No. 500214.

Respectfully submitted,
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